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Capturing Live Combat in Network Centric Warfare

DARPA is on the verge of revolutionizing command technologies. For 18 months, DARPA has been deployed with the US Army in Iraq in support of what we call the Command Post of the Future (CPOF). This has given us invaluable firsthand experience in developing command technologies. It has provided a huge corpus of data about the command environment, at a level of granularity never before imagined. We have truly begun to capture live combat, and what we're learning is helping us establish a foundation for a truly comprehensive adaptive command environment, one that focuses on the human aspects of command.

In his paper "Developing Adaptive Leaders," Professor Leonard Wong states that, "junior officers are being developed into creative, innovative, and independent leaders." He attributes this shift in leader development to the needs of the ambiguous, complex, and unpredictable environment of postwar Iraq. The implication is significant. For years, the leadership literature in both the military and civilian arenas has called for more adaptable and innovative leaders. Now, finally, the military is transforming its lowest officer ranks into leaders equipped to deal with uncertain and fluid situations. DARPA is helping the military leverage this new and valuable asset and begin cultivating today the kind of confident and creative senior leaders our Armed Forces and our country will need tomorrow.

Along the way, there are questions we must answer. For example, how can we harness this newfound power to capture live combat? How can we use it to pass along the combat experiences of today to the combat leaders of tomorrow? Can we really teach people to master ambiguity, change, and complexity? And this is the core question for me right now: can we test, measure, and enhance an individual's intuitive knowledge?

The speakers before me have clearly shown that DARPA is working hard to provide the communications links, protocols, and intelligent networks to enable network-centric warfare. I am here to tell you that DARPA is equally interested in creating new applications that will enable our military commanders at all levels to leverage these advances in network technology to develop stronger and more effective leaders.

When I first joined ATO, Dr. Honey convinced me of the importance of the application layer of network-centric warfare. He compared where we are today to another very exciting time at DARPA, the late 1960s and early 1970s, when the ARPAnet was created. Back then, for the first time, thousands of computers all over the country were networked and sharing information. It was the technological breakthrough that led to the Internet.

Yet it was surprisingly slow to catch on. The majority of Americans did not start using applications that took advantage of this breakthrough for more than 20 years. I didn't send my first e-mail until 1994.

America's men and women in combat can't wait 20 years. And it's DARPA's job to make sure they don't have to. We're determined that the applications to make full use of the network-centric command will emerge simultaneously with the network infrastructure. CPOF is a tremendously successful first step on that path. First deployed to Iraq in April 2004, with the 1st Cavalry Division, CPOF is a distributed command and control application that anticipates the day when a command post is not a physical location but a virtual reality. It creates a collaborative environment in which everyone in the network can follow situations, share the thoughts and reactions of the Soldiers in that situation, and establish a platform for parallel planning and execution.

When DARPA contractors teamed with Soldiers from the 1st Cavalry Division to take this experimental technology to war, it was a huge leap of faith on the part of a visionary leader and a dedicated group of his Soldiers. Here's what that visionary leader, Major General Peter Chiarelli, had to say about CPOF's performance in Iraq.

> I think it is going to have an impact, not only on the tactics, techniques, and procedures we use to command and control. I think it is going to have an impact on the size of our staffs, what our staffs do. The wargaming process is so critical to the Military Decision Making Process, it [CPOF] is going to change everything we do and how we fight. I, in 32 years in the Army, have never seen a single system that will have a greater impact on our Army and our entire Joint Force than CPOF.

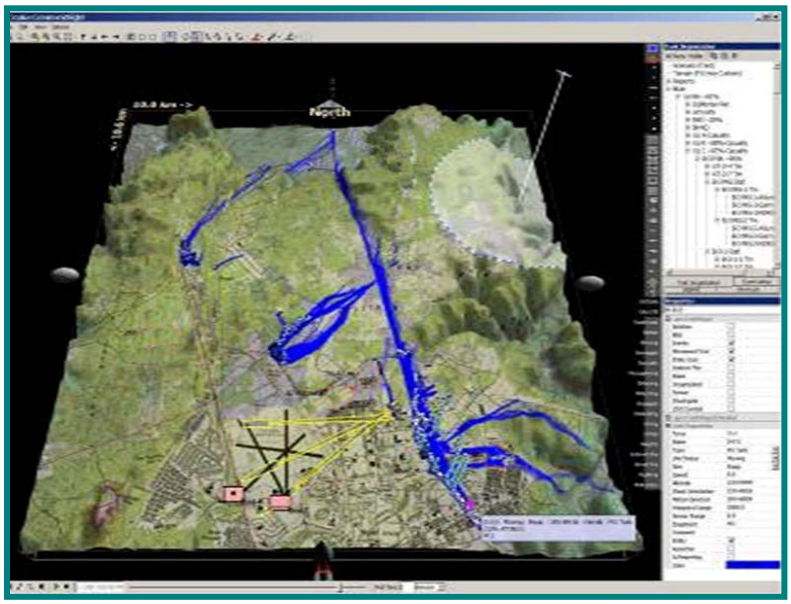
Why such a glowing review? Because CPOF enables commanders to capture the command process, capture live combat, with a fineness of detail never before possible. Through CPOF, commanders can know the location of every vehicle in the field. They can know who placed every ink stroke, icon, and task on the map, and when they did it. They have a detailed history of how information moves through the command structure, and can predict where a significant activity will move through the system. They can see which players joined to solve certain problems and hear the voice record of daily updates and crisis responses.

I have been leading an effort in which nine teams are pouring through this data. They're extracting patterns, looking for repeatable actions, identifying anomalies, gaining an understanding of the information flow of an organization, and discovering many unexpected benefits of a network centric application. This effort, CPOF Pattern Discovery, is coming to an end this month, and I'm eager to apply what we've learned to creating the Adaptive Command Environment.

Early results from CPOF Pattern Discovery indicate we will be able to create command applications that can adapt to how users interact with the system. Individuals will be able to process and organize information in different ways, based on their different information needs and abilities to handle help from a computer.

These applications will be able to monitor and adapt to the user's collaborations. Who does he talk to, when, about what, and why? They will be able to monitor and adapt to the operational environment. When do operational anomalies occur? What events trigger specific responses?

As information sources come and go, the system will be able to identify which sources and information are relevant to its users. And as the system begins to learn its environment, the walls between planning, rehearsal, execution, monitoring,



and after-action review will crumble. When a novel tactic is rehearsed, the system will be able to remember it and keep an eye out for opportunities to use it in real-world operations.

For the first time, we will have a gold-standard collection of data for building and testing emerging learning technologies.

Today, CPOF is being used in Iraq by the 3rd Infantry Division, and it's scheduled to go Army-wide in April 2006. Initially, it was deployed only at the division and brigade levels. We have begun scaling it down to the battalion level, and I look forward to a day when network-centric applications are deployed at the vehicle and soldier level. Imagine if we had the battle for Fallujah recorded at the company, platoon, and squad levels; the sketches, actions, words of the commanders as they fought that fight. That record would revolutionize the way we train and prepare our military leaders to deal with similar combat situations in the future. Instead of reading a book about the Battle of Fallujah, military students of the future will learn interactively and at a truly immersive level of detail.

Clearly, there are concerns about the applications I'm talking about; e.g., concerns about the potential misuse of voice and data recordings and the unwillingness of commanders to use recording technology, for fear of being micromanaged or caught up in legal reprisals. I ask you to suspend those concerns for the moment and focus instead on the potential of this technology for military command.

I pose two challenges. Team your network specialists, human factors engineers, and military subject matter experts and help us create an Adaptive Command Environment. An environment that can immediately take advantage of network-centric technologies. Help us develop network-centric systems that will revolutionize training and develop ways to groom the next generation of adaptive leaders.

And I offer an invitation. Do you have technology that learns and adapts by monitoring dynamic data flows? Can you capture and record context by monitoring unstructured dialog? Are you a human factors engineer who understands dynamic visualizations and intelligent display technology? We need to talk.